

AMENDMENTS TO THE CLAIMS

The listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims

Please amend the claims as follows:

1. (Currently Amended) A differential load driving circuit comprising:
a plurality of power switches ~~selectively~~ coupled to a load and for transferring power to said load, wherein each power switch of said plurality of power switches is either fully on or fully off;
a plurality of power switch driving circuits for controlling switching states of said plurality of power switches respectively and for selectively coupling at least one power switch of said plurality of power switches to a PWM (pulse width modulation) signal so as to enable a PWM powering mode, said power switch driving circuits comprising a first switch driving circuit comprising:
a first switch that couples and decouples a first current source from said load;
a second switch coupled in parallel with said first switch and that couples and decouples a first power switch to Vcc;
a third switch coupled in parallel with said second switch and that couples and decouples said first power switch to said PWM signal;
a fourth switch coupled in parallel with said first switch and that couples and decouples a second power switch to ground; and

a fifth power switch coupled in parallel with said fourth switch and that couples and decouples said second power switch to said PWM signal; and
~~a first current source selectively coupled to said load and for supplying current to said load so as to enable a linear powering mode;~~
~~at least one current source switch operable for coupling said first current source to said load; and~~
a controller for controlling said plurality of power switch driving circuits and ~~said~~ ~~at least one current source switch,~~ and for either selecting said PWM powering mode in which said PWM signal controls said at least one power switch or selecting a ~~said~~ linear powering mode in which said first current source supplies current to said load, and for controlling a switchover point between said PWM powering mode and said linear powering mode according to a predetermined threshold to achieve a specified ripple current of said load.

2. (Canceled).
3. (Previously Presented) A differential load driving circuit as claimed in claim 8, further comprising a second current source, wherein said first current source supplies power to said load in said cooling mode, and wherein said second current source supplies power to said load in said heating mode.
4. (Currently Amended) An H-Bridge load driving circuit, comprising:
four power switches forming an H-Bridge circuit ~~selectively~~ coupled to a load and for selectively transferring power to said load, wherein each power switch of said

plurality of power switches is either fully on or fully off;

a plurality of power switch driving circuits operable for controlling switching states of said four power switches respectively and for selectively and concurrently coupling at least two power switches of said four power switches to a PWM (pulse width modulation) signal ~~so as~~ to enable a PWM powering mode;

at least one current source selectively coupled to said load and for supplying current to said load so as to enable a linear powering mode;

at least one current source switch operable for coupling said at least one current source to said load; and

a controller for controlling said plurality of power switch driving circuits and said at least one current source switch, and for either selecting said PWM powering mode in which said PWM signal controls said at least two power switches or selecting said linear powering mode in which said at least one current source supplies current to said load, and for controlling a switchover point between said PWM powering mode and said linear powering mode according to a predetermined threshold to achieve a specified ripple current of said load.

5. (Previously Presented) An H-Bridge load driving circuit as claimed in claim 4, wherein said linear powering mode comprises a cooling mode and a heating mode, and wherein a direction of current flowing through said load in said cooling mode is opposite to a direction of current flowing through said load in said heating mode.

6. (Previously Presented) An H-Bridge load driving circuit as claimed in claim

4, wherein said PWM powering mode comprises a cooling mode and a heating mode, and wherein a direction of current flowing through said load in said cooling mode is opposite to a direction of current flowing through said load in said heating mode.

7. (Previously Presented) A differential load driving circuit as claimed in claim 1, wherein said PWM powering mode comprises a cooling mode and a heating mode, and wherein a direction of current flowing through said load in said cooling mode is opposite to a direction of current flowing through said load in said heating mode.

8. (Previously Presented) A differential load driving circuit as claimed in claim 1, wherein said linear powering mode comprises a cooling mode and a heating mode, and wherein a direction of current flowing through said load in said cooling mode is opposite to a direction of current flowing through said load in said heating mode.

9. (Previously Presented) A differential load driving circuit as claimed in claim 1, further comprising at least one filter circuit coupled between at least two power switches of said plurality of power switches and said load.

10. (Previously Presented) A differential load driving circuit as claimed in claim 1, wherein said load comprises a thermal electrical cooler.

11. (Currently Amended) A differential load driving circuit comprising:
a plurality of power switches ~~selectively~~ coupled to a load and for selectively transferring power to said load under control of power switch driving circuits, wherein

each power switch of said plurality of power switches is either fully on or fully off;

a first current source selectively coupled to said load and for supplying current to said load so as to enable a linear powering mode, wherein said power switch driving circuits include a first switch driving circuit comprising:

a first switch that couples and decouples said first current source from said load;

a second switch coupled in parallel with said first switch and that couples and decouples a first power switch to Vcc;

a third switch coupled in parallel with said second switch and that couples and decouples said first power switch to said PWM signal;

a fourth switch coupled in parallel with said first switch and that couples and decouples a second power switch to ground; and

a fifth power switch coupled in parallel with said fourth switch and that couples and decouples said second power switch to said PWM signal; and

a controller for controlling said first, second, third, fourth and fifth ~~plurality of power~~ switches and said first current source, and for either selecting a PWM powering mode in which a PWM (pulse width modulation) signal controls at least one power switch of said plurality of power switches or selecting said linear powering mode in which said first current source supplies current to said load, and for controlling a switchover point between said PWM powering mode and said linear powering mode according to a predetermined threshold to achieve a specified ripple current of said load.

12. (Canceled).

13. (Currently Amended) A differential load driving circuit as claimed in claim 11, wherein said linear ~~PWM~~ powering mode comprises a low current mode in which a direction of current through said load defines a cooling mode.

14. (Currently Amended) A differential load driving circuit as claimed in claim 11, wherein said linear ~~PWM~~ powering mode comprises a low current mode in which a direction of current through said load defines a heating mode.

15. (Currently Amended) A differential load driving circuit as claimed in claim 11, wherein said PWM ~~linear~~ powering mode comprises a high current mode in which a direction of current through said load defines a cooling mode.

16. (Currently Amended) A differential load driving circuit as claimed in claim 11, wherein said PWM ~~linear~~ powering mode comprises a high current mode in which a direction of current through said load defines a heating mode.

17. (Previously Presented) A differential load driving circuit as claimed in claim 1, wherein at said switchover point, a load current in said PWM powering mode is slightly less than a load current in said linear powering mode.

18. (Previously Presented) A differential load driving circuit as claimed in claim 1, wherein said specified ripple current is above zero.

19. (Previously Presented) A differential load driving circuit as claimed in claim

1, wherein said controller comprises an input receiving said threshold.

20. (Original) A differential load driving circuit as claimed in claim 1, wherein said controller further receives a feedback signal from said load for controlling power delivered to said load in both said linear powering mode and said PWM powering mode.

21. (Original) A differential load driving circuit as claimed in claim 1, wherein said first current source is decoupled from said load in said PWM powering mode.

22. (Original) An H-Bridge load driving circuit as claimed in claim 4, wherein said controller further receives a feedback signal from said load for controlling power delivered to said load in both said linear powering mode and said PWM powering mode.

23. (Original) An H-Bridge load driving circuit as claimed in claim 4, wherein said at least one current source is decoupled from said load in said PWM powering mode.

24. (Original) A differential load driving circuit as claimed in claim 11, further comprising: a plurality of power switch driving circuits for controlling switching states of said plurality of power switches respectively and for selectively coupling at least one power switch of said plurality of power switches to said PWM signal so as to enable said PWM powering mode.

25. (Original) A differential load driving circuit as claimed in claim 11, further comprising: at least one current source switch for coupling said at least one current

source to said load so as to enable said linear powering mode.

26. (Original) A differential load driving circuit as claimed in claim 11, wherein said controller further receives a feedback signal from said load for controlling power delivered to said load in both said linear powering mode and said PWM powering mode.

27. (Original) A differential load driving circuit as claimed in claim 11, wherein said first current source is decoupled from said load in said PWM powering mode.